REMARKS

The applicants' remarks below are preceded by quotations of relevant remarks of the examiner in bold-face, small type.

The information disclosure statement filed 5/15/01 fails to comply with the provisions of 37 CFR 1.97, 1.98, and MPEP § 609, because reference AE and AJ lack a publication date on the actual copy, only a journal name was noted.

A supplemental information disclosure statement that includes references AE and AJ is being filed herewith. Reference AE (Akutsu *et al.*) lists a publication date of 1999 and reference AJ (Liang *et al.*) lists a publication date of 1998.

The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code, such as on page 6, line 25; page 10, line 17; and page 26, lines 13-14. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

The disclosure is objected to because of the following informality: "algrebraic" is misspelled on page 11, line 2. Correction of this error and any other spelling errors is requested.

The specification has been amended.

Claims 6, 23, 41, 101, and 105 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 6, 23, and 101 recite the term "reflective" which is vague and indefinite. It is unclear what is meant by this term and what determines the rules to be "reflective." Clarification of the metes and bounds of this term via clearer claim wording is requested.

Claims 6 and 23 are amended. An exemplary reference to the term "reflective" can be found at page 9, lines 11-15:

> Rewriting logic is "reflective," and thus can be used to make and evaluate assertions about itself. This capability is also described as "metalogic" or "metaprogramming." Thus, a rewriting logic computational environment, such as Maude (see below), can be used to formulate metalogic statements that test theories and/or analyze the properties of rules and systems.

Claim 41 recites the phrase "*infinite* substitution chains are det cted" which is vague and indefinite. It is unclear how one can detect that the chains are infinite or at what point or threshold the detection is declared infinite. Clarification of this phrase via clearer claim wording is requested.

An exemplary method for detecting infinite substitution chains is described at page 8, lines 13-21 of the specification:

> For example, the set of rules:
>
> $a{:}b \rightarrow b{:}a$, $b{:}a \rightarrow a{:}b$
>
> is non-terminating. When the input state is "*ab*," the rewriting rules do not reach a solution for evaluating the system. Non-termination rules can cause "infinite substitution chains." The inference engine can be configured to detect such infinite substitution chains. Further, the two nonterminating rules above effectively express commutativity. An inference engine may detect rules expressing commutativity of an operator, and replace them with the explicit notation that the operator is commutative. This requires the inference engine to have built-in treatment of commutativity, e.g., including commutative matching.

Claim 105 recites the phrase "the software is further to cause the processor to..." which is vague and indefinite. It is unclear what is further done with the software. Clarification of this phrase via clearer claim wording is requested.

Claim 105 has been amended.

Claims 1-4, 5, 7-8, 10-11, 14, 34-37, 51-52, 54, 56-57, 59, and 62 are rejected under 35 U.S.C. 102(b) as being anticipated by Kohn (Molecular Biology of the Cell, 1999, Vol. 10, pages 2703-2734).

Kohn discloses a method that can be used in the generation of functional models (page 2703, col. 2, lines 7-8 and 16-18) to organize interactions via symbols in the form of a diagram, map, and /or database (abstract, lines l-2 and 5-6). Kohn discloses representing modifications by unique graphical constructs (page 2704, col. 1, lines 21-24) as well as actions or effects of each molecular species or interaction (page 2704, col. 1, lines 26-27). Kahn discloses the representation of all possible combinations is impractical; however, it is important to represent important combinations (page 2704, col. 1, lines 33-36). Kohn discloses symbols, rules, and the representation of interactions as lines (page 2704, col. 1, lines 37-42 and Figure 1) as stated in claims 1, 11, and 34. Kohn discloses the rule that molecular species should only appear once in the diagram and various interactions are represented as various types of lines connecting the species (page 2704, col. 1, lines 37-42). Kohn discloses the associative relationship between at least two molecular species in Figure 6 as well as the substitution of one symbol by another shown in the seventh symbol example in Figure 1 as stated in claims 1, 2, 34, and 51. The substitution of one symbol by another is interpreted to satisfy the idea s t forth in the specification which stat s "the rewrit process det cts multiple alternative states, symbols pr sent in all alternative states can be display d with one color" (page 17, lines 20-23). Kohn discloses alt rnative results

due to the binding of different proteins at the same site (page 2704, c l. 2, lines 19-23 and Figure 2) and a representation of effects specific to any combination of interactions (page 2704, col. 2, lines 25-29).

Kohn begins on page 2703, column 1, by stating:

> The complexity of molecular interactions implicated in cell regulatory networks challenges human comprehension. . . . The present work describes and applies a diagram method designed to cope with these complexities.

Kohn later states on page 2715, column 1:

> The primary objective here was to suggest how complex molecular interaction networks can be usefully displayed. [emphasis added]

Thus, Kohn emphasizes that the purpose of his maps is to facilitate human comprehension by visualizing molecular interactions. Kohn discusses the relationship between his maps to computer simulations, for example, on page 2715, column 1:

> The complexity of the map, however, demands that great care be taken in formulation of specific functional hypotheses, which may have to be investigated with the aid of computer simulations (Kohn, 1998).

The passage indicates that the "hypotheses" could be investigated by computer simulations, not that the maps themselves could be used in the simulation. Kohn's maps include lines and other graphics for visualization by human users. One graphic, noted by the Examiner, is "the seventh symbol example in Figure 1":

Stoichiometric conversion of A into B.

This graphic uses symbols to illustrate a chemical conversion: a first compound, symbolized by A, is chemically converted to a second compound, symbolized by B. This graphic, however, does not suggest substituting symbol A with the symbol B. Moreover, Kohn does not teach or suggest how this graphic could be used, other than for viewing by a human user.

The method of claim 1 includes expressing rules in a manner that enables an inference engine to process them by substituting symbols. Kohn does not teach or suggest using his maps in a manner that enables an inference engine to process them by substituting symbols. The method of claim 34 includes processing an initial state using rules that express a substitution of symbols. Kohn also does not teach or suggest this method.

Claims 1, 2, 7-8, 11, 14, 16-17, 34-37, 39-40, 44-51, 56-57, 62, and 64-76 ar reject d under 35 U.S.C. 102(e)(1) as being anticipated by Allen et al. (Patent Application Publication US 2002/0068269).

Allen et al. disclose a method and system for examining a biological system (page 1, paragraph 0002). Allen et al. disclose the invention to predict interactions between biological elements (page 1, paragraph 0005). Allen et al. disclose an output module and a graphical display of the interactions in Figure 14 (and page 3, paragraph 0027), including symbols of biological elements and lines representing substitutions or associations as stated in claims 1, 2, 11, 51, and 67. The substitution of one symbol by another is interpreted to satisfy the idea set forth in the specification which states "the rewrite process detects multiple alternative states, symbols present in all alternative states can be displayed with one color" (page 17, lines 20-23). Allen et al. disclose an inference engine linked to a database of known cellular components and reactions to generate signal cascades (page 1, paragraph 0007).

Allen describes an inference engine which operates as follows:

> [0030] The Inference Engine 14, working with the Database 80, evaluates a sequence of logic statements to determine which cellular events should be triggered based on the cellular environment present at the decision making moment.

The flowcharts depicted in Fig. 2A and 2B of Allen and the accompanying text, e.g., paragraphs 56 to 70, may also represent an embodiment of "evaluat[ing] a sequence of logical statements." At least one embodiment of Allen appears to test conditions to determine if an event occurs:

> [0208] The events determine which concepts react, what concepts are produced as a result, the processes that occur within the reaction, and what determines whether or not the reaction will proceed.

Allen's descriptions of "events" and "evaluat[ing] a sequence of logical statements" do not teach or suggest using rules that express a substitution of symbols in a manner that enables an inference engine to process them, as in the method of claim 1. Similarly, Allen does not teach or suggest processing an initial state using such rules or iteratively substituting symbols using rules, as in the methods of claims 34 and 66, respectively.

The examiner relies on the output module of Allen mentioned in paragraph 27 of Allen and on FIG. 14 of Allen. A representative section of FIG. 14 is below:

As noted by the Examiner, the depiction in FIG. 14 is produced by an output module, presumably for viewing by a user. Contrary to the notion of substituting symbols, Allen describes the depiction as a "static display" in paragraph 122 :

> [A] preferred <u>static</u> display of pathways is as shown in window 5110 in FIG. 14. [emphasis added]

Thus, just like Kohn's maps, the window shown in FIG. 14 of Allen is merely a graphic for visualization by a human user.

The applicants note that the examiner has relied on one excerpt from the specification in discussing rejections based on both Allen and Kohn. The examiner's comment from page 7 of the Office Action is repeated below:

> **The substitution of one symbol by another is interpreted to satisfy the idea set forth in the specification which states "the rewrite process detects multiple alternative states, symbols present in all alternative states can be displayed with one color" (page 17, lines 20-23).**

This excerpt is taken from the following context of the specification on page 17, lines 16-24:

> The wiring diagram can also be used to display the output of a rewrite process. Points corresponding to symbols present in the output state can be displayed with one color, whereas symbols absent in the output state can be displayed with another color. When the rewrite process detects multiple alternative states, symbols present in all alternative states can be displayed with one color, symbols absent from all alternative states can be displayed with another color, and symbols whose presence or absence varies among the alternative states can be displayed with a third color. Thus, the user is graphically conveyed an image of the biological system after the rewrite process.

This excerpt is not a general description or definition of substitution. The excerpt merely describes a particular implementation for displaying an output state. Moreover, use of a rewrite process is also only a particular embodiment of the invention.

> **Claims 1, 2, 7-8, 11, 14, 16-17, 34-37, 39-40, 42-51, 56-57, 62, and 64-76 are rejected under 35 U.S.C. 102(e)(l) and (2) as being anticipated by Allen et al. (Patent Application Publication US 2002/0068269) and Fant et al. (P/N 5,805,461).**
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> **Allen et al. describe the limitations of claims 1, 2, 7-8, 11, 14, 16-l7, 34-40, 44-51, 56-57, 62, and 64-76. Allen t al. state th system in their Inv ntion Includes a display modul with graphical representations (page 2, paragraph 0013). Howev r, All n et al. do not specifically d scribe a wiring diagram, it is inh rent that a graphical**

representation can take the form of a wiring diagram as stated in claim 42. Fant et al. describe a method and system featuring interactions (col. 12, lines 4-8) with graphical representations in the form of wiring diagrams (Figures 13-14) as stated in claims 42-43. This method and system involves symbolic process expression (col. 5, lines 31-32) with associative and transforming rules with values (col. 15, lines 2-3). As MPEP 2131.01 states, "To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Continental Can Co. USA v. Monsanto Co., 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991).

Thus, Allen et al. and Fant et al. anticipate claims 1, 2, 7-8, 11, 14, 16-17, 34-37, 39-40, 44-51, 56-57, 62, and 64-76.

As discussed above, Allen does not describe using rules that express the substitution of symbols. The examiner relies upon Fant to supply elements (particularly a wiring diagram) not described by Allen. The applicants note that, of the claims rejected in view of Allen and Fant, only claims 42 and 43 use the term "wiring diagram." Thus, applicants are uncertain as to whether or how Fant is relied upon to reject independent claims 1, 34, and 66.

Claim 1 is rejected under 35 U.S.C. 102(e)(2) as being anticipated by Yoshida et al. (P/N 6,438,496 BI).

Yoshida et al. disclose a method and apparatus that enables the recognition of a characteristic included in a symbolic sequence that was not previously recognized (col. 1, lines 8-17). Yoshida et al. disclose genetic information specified by symbolic sequence (col. 1, lines 20-24). Yoshida et al. disclose a symbolic sequence that is converted to a parallel sequence of partial symbolic sequences (col. 1, lines 57-60). Yoshida et al. disclose alternatives of positional relation alignments (col. 2, lines 3-12). Yoshida et al. disclose the converted parallel sequence is outputted using one or more expression means such as hue, lightness, or saturation of color (col. 2, lines 17-20). Yoshida et al. disclose operations, or rules, such as the one to extract letters from the parallel sequence of the partial symbolic sequence (col. 2, lines 26-31 and col. 3, lines 52-63) which is reasonably interpreted as a form of substitution. Yoshida et al. disclose Figure 14 which represents extraction of symbolic sequence I to be processed with changing the initial point, from a symbolic sequence M (col. 5, lines 6-8). Yoshida et al. disclose using a computer processor for the above-mentioned method.

Thus, Yoshida et al. anticipate the limitations in claim 1.

The method of claim 1, as amended, includes generating a model of a biological system that includes at least some rules that represent interactions between biological elements. Yoshida's model of a single molecule does not include rules that represent interactions between biological elements.

Claims 18-22, 24-25, 27,30, 96-100, 102-103, and 106-108 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohn (Molecular Biology of the Cell, 1999, Vol. 10, pages 6 2703-2734) and Allen et al. (Patent Application Publication US 2002/0068269).

Kohn and Allen et al. describe the limitations of claims 18-20, 22, 24-25, 27, 30, 96-98, 100, 102-103, and 106-108 as seen in the above-mentioned 102(a) and 102(b) rejections. Kohn and Allen et al. lack a machine-readable medium having encoded the limitations of claims 18-20, 22, 24-25, 27, 30, 96-98, 100, 102-103, and 106-108. However, it would have been obvious to one of ordinary skill in the art at the time the invention to store any particular information from the computer to a machine-readable medium in order to integrate vast information and perform with complete knowledge all of the players involved in order to simulate pathways, as stated by Allen et al. (page 1, paragraphs 0004 and 0006). One of ordinary skill in the art would have been motivated to store sequence information on a computer readable medium just as a patent is already on a computer readable medium as part of the PTO Patenting search system which is publically available. Thus, Kohn and Allen et al. motivate the limitations in claims 18-20, 22, 24-25, 27, 30, 96-98, 100, 102-103, and 106-108.

The article of claim 18 has encoded thereon a model of a biological system. As discussed above, Kohn's maps and Allen's window shown in FIG. 14 are graphics for human visualization. Neither Kohn nor Allen suggest encoding rules on a machine readable media in a manner that would enable an inference engine to process the rules by substituting symbols to infer alternative results.

The articles of claim 96 and 106 have encoded thereon software that is configured to cause a processor to iteratively substitute symbols. For the reasons discussed above, neither Allen nor Kohn discloses or suggest causing a processor to iteratively substitute symbols. Thus, Allen and Kohn cannot make obvious the articles of claims 18, 96 and 106.

The applicants do not concede any positions of the examiner that are not expressly addressed above, nor do the applicants concede that there are not other good reasons for patentability of the presented claims or other claims.